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Organization: NC2

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### S&MA Internship to Support Orion and the European Service Module Abstract

As a University Space Research Association (USRA) intern for NASA Johnson Space Center (JSC) during the summer 2016 work term, I worked on three main projects for the Space Exploration Division (NC) of the Safety and Mission Assurance (S&MA) Directorate. I worked on all three projects concurrently.

One of the projects involved facilitating the status and closure of technical actions that were created during European Service Module (ESM) safety reviews by the MPCV Safety & Engineering Review Panel (MSERP). The two main duties included accurately collecting and summarizing qualitative data, and communicating that information to the European Space Agency (ESA) and Airbus (ESA's prime contractor) in a clear, succinct and precise manner. This project also required that I create a report on the challenges and opportunities of international S&MA. With its heavy emphasis on soft skills, this project taught me how to communicate better, by showing me how to present and share information in an easy-to-read and understandable format, and by showing me how to cooperate with and culturally respect international partners on a technical project.

The second project involved working with the Orion Thermal Protection System (TPS) Process Failure Modes and Effects Analysis (PFMEA) Working Group to create the first full version of the Orion TPS PFMEA. The Orion TPS PFMEA Working Group met twice a week to analyze the Avcoat block installation process for failure modes, the failure modes effects, and how such failure modes could be controlled. I was in charge of implementing changes that were discussed in meeting, but were not implemented real time. Another major task included creating a significant portion of the content alongside another team member outside the two weekly meetings. This project caused me to become knowledgeable about TPS, heatshields, space-rated manufacturing, and non-destructive evaluation (NDE). The project also helped me to become better at working with a small team and helped improved my technical communication skills.

My main duty for the third project was creating a Safety Verification Tracking Log (SVTL) for the Orbital Maneuvering System Engine (OMS-E), and contacting subject matter experts to close Hazard Report (HR) control verifications. This project also required me to support other OMS-E safety process tasks, like monitoring OMS-E vibration testing for Quality Assurance (QA) purposes. This project helped me become even more proficient in Excel. Throughout the project, I gained knowledge about the OMS-E system and improved my understanding of pressure systems and propellant systems.

In terms of education goals, this work term has affirmed my desire to take a few more space-related courses, like orbital mechanics, so that I can have a better understanding of human spaceflight and the industry surrounding it. However, the work term did not persuade me to pursue a master's degree.

In terms of career goals, this work term has helped me clarify the direction I would like to head in the future. The perspective of three summer terms working for NASA in S&MA has allowed me to observe that most S&MA employees joined S&MA after working in other NASA directorates, such as Engineering or Flight Operations. It is my belief that it would be advantageous for both NASA and I for me to broaden my knowledge base and technical skill set by completing hands-on technical work on human spaceflight projects, and for me to integrate my safety experience directly into technical work in other directorates. The other significant advantage to this proposed situation is that if I were to eventually return to S&MA, I would be returning with a substantial set of hands-on technical experience and knowledge, which would be a significant resource for S&MA tasks and projects.